



# PtL roadmap

Sustainable aviation fuel from renewable energy sources for aviation in Germany

Joint roadmap of the Federal Government, the German Länder, the aviation industry, the petroleum industry as well as plant manufacturers and operators for the market ramp-up of sustainable aviation fuel from renewable energy sources.

Aviation is vital as a means of transport for people and goods in a free and globalised world. At the same time, air transport accounts for 2.8 per cent of global anthropogenic CO<sub>2</sub> emissions. Aviation is responsible for 3.5 per cent of anthropogenic warming since the beginning of industrialisation, most recently (before the Covid 19 pandemic) the annual contribution was about 5.5 per cent. There are a number of levers to be employed to make flying sustainable in the future and harmonise it with climate action and the ambitious climate targets agreed upon at the national and international levels: greening and modernising the aviation fleet, optimising processes both in the air and on the ground, improving intermodal transport, carbon pricing instruments, and not least, developing new, more efficient technologies and new aircraft types powered by hydrogen. Synthetic, sustainably produced fuels are another technological module.

Since the transition to hydrogen as an energy source for gas turbines and fuel cells will take some more time and such a transition is not possible for the existing aviation fleet, it is essential to substitute fossil kerosene with kerosene made from sustainably produced, renewable energy sources and raw materials to make flying carbon-neutral and sustainable. In this context, electricity-based (PtL, power-to-liquid) kerosene from renewable energy sources in particular play a key role: the use of such fuels can significantly reduce the emissions from aviation, provided that renewable energy sources were used in their production.

With the PtL roadmap, the actors involved have outlined measures and a time frame to set up and expand the production of PtL kerosene in the near future, aiming to have a minimum of 200,000 tonnes of PtL kerosene available for German aviation by 2030. It is intended to achieve this objective by means of the following activities:

- ⊕ **The technological development** of individual PtL production plants and components needs to be optimised. At the same time, it is important to ensure that these are compatible with each other in terms of overall technical integration even when used at an industrial scale.
- ⊕ **Sustainability criteria** need to be defined in a uniform, binding, and reliably ecological and social manner.
- ⊕ **Supporting the market-ramp up** by establishing binding targets for the use and sale of renewable kerosene, by regulatory framework conditions for a self-sustaining market while avoiding distortions of competition, and state funding not linked to a specific technology. This is supplemented by the air carriers' commitment to purchasing relevant quantities of PtL in future years.

**The PtL roadmap summarises the basic measures and the time frame for the market ramp-up of PtL as follows:**



The comparatively high production costs at the moment are a key challenge. A self-sustaining market for PtL kerosene will require both a balanced mixture of state action and the willingness of the individual actors, inter alia, the petroleum industry, plant manufacturers, air carriers and airline passengers to contribute their share to the incremental costs of this sustainable fuel. For Europe’s aviation sector to contribute to achieving climate targets, it will be necessary to massively expand the use of renewable energy sources within the EU and beyond. In addition, at the international and European levels in particular, regulatory preconditions must be defined to ensure that climate targets are complied with and to ensure fair competition.

Germany now has the opportunity to develop and expand crucial industry know-how and technological leadership in producing and using PtL kerosene. The roadmap shows how this can be achieved in a joint effort by all actors.

A continuous monitoring is in place for implementing this roadmap. In addition, projects initiated by the actors in promoting PtL kerosene are documented and made accessible to a broader public.

**Published by**

**Federal Ministry for the Environment, Nature Conservation and Nuclear Safety**  
 Stresemannstraße 128 - 130 | 10117 Berlin | [www.bmu.de/en](http://www.bmu.de/en)

**Federal Ministry of Transport and Digital Infrastructure**  
 Invalidenstraße 44 | 10115 Berlin | [www.bmvi.de/en](http://www.bmvi.de/en)

**Federal Ministry for Economic Affairs and Energy**  
 Scharnhorststraße 34-37 | 10115 Berlin | [www.bmwi.de/en](http://www.bmwi.de/en)

**Federal Ministry for Economic Cooperation and Development**  
 Stresemannstraße 94 | D-10963 Berlin | [www.bmz.de/en](http://www.bmz.de/en)

**German Aviation Association (BDL)**  
 Friedrichstraße 79 | 10117 Berlin | [www.bdl.aero](http://www.bdl.aero)